I CLAIM:

1. A fluid recuperator, comprising:

a frame;

an enclosure provided about said frame defining a recuperator chamber;

a first fluid inlet in fluid communication with said recuperator chamber;

a first fluid outlet in fluid communication with said recuperator chamber;

a plurality of spaced sealed recuperator units received within said recuperator chamber, each of said recuperator units having a body with an outer surface and an inner surface that defines a second fluid flow chamber;

a second fluid inlet in fluid communication with said plurality of sealed recuperator units; and

a second fluid outlet in fluid communication with said plurality of sealed recuperator units, whereby said recuperator is adapted to have a first fluid flow through said first gas inlet, said recuperator chamber across said sealed recuperator units outer surfaces and through said first fluid outlet, respectively, while a second fluid passes through said second fluid inlet, through said second fluid flow chambers, contacting inner surfaces of said sealed recuperator units and through said second fluid outlet in a manner that the first fluid and the second fluid do not mix while passing through said recuperator chamber and heat transfer takes place between the fluids through said bodies of said sealed recuperator units.

2. A recuperator as claimed in claim 1, wherein said first fluid and said second fluid comprise a first gas and a second gas.

3. A recuperator as claimed in claim 2, wherein said first gas is hotter than said second gas.

4. A recuperator as claimed in claim 3, wherein said first gas is a product of combustion and said second gas is air.

5. A recuperator as claimed in claim 4, wherein said air is compressed air.

6. A recuperator as claimed in claim 1, wherein said recuperator chamber is annular shaped.

7. A recuperator as claimed in claim 6, wherein said frame is annular shaped.

8. A recuperator as claimed in claim 7, wherein said frame defines a plurality of circumferentially spaced passages that are in fluid communication with respective ones of said second fluid inlets of each of said plurality of sealed recuperator units.

9. A recuperator as claimed in claim 1, further comprising a plurality of open recuperator units positioned between said sealed recuperator units, respectively, each of said open recuperator units having a body defining flow passageways for the first fluid.

10. A recuperator as claimed in claim 9, wherein said open recuperator units each comprise a corrugated body defining a plurality of elongated passageways.

11. A recuperator as claimed in claim 9, wherein each of said open recuperator units is removably secured to said frame.

12. A recuperator as claimed in claim 1, wherein an inner surface of said frame defines said second fluid inlet.

13. A recuperator as claimed in claim 1, wherein said sealed recuperator unit further comprises a heat transfer member received within said second fluid flow chamber.

14. A recuperator as claimed in claim 13, wherein said heat transfer member defines a plurality of elongated passageways.

15. A recuperator as claimed in claim 14, wherein said heat transfer member is a corrugated member having a plurality of apexes.

16. A recuperator as claimed in claim 15, wherein said apexes contact the inner surface of said spaced sealed recuperator units.

17. A recuperator as claimed in claim 16, wherein said apexes are attached to respective said inner surfaces of said sealed units.

18. A recuperator as claimed in claim 13, wherein said second fluid inlet permits said second gas to enter in a first direction and said second gas passes along said heat transfer member in a second direction, wherein the first direction is different from the second direction.

19. A recuperator as claimed in claim 18, wherein the first direction is transverse to the second direction.

20. A recuperator as claimed in claim 19, wherein each of said sealed recuperator units comprises a plurality of sides and said second fluid inlet and said second fluid outlet are positioned on the same side of said sealed recuperator unit.

21. A recuperator as claimed in claim 20, wherein each of said heat transfer members has a length and a width, the length of the heat transfer unit varies as a function of the width.

22. A recuperator as claimed in claim 20, wherein each of said second fluid inlet and second fluid outlet comprises lips attached to said frame.

23. A recuperator as claimed in claim 22, wherein said lips are welded to said frame.

24. An annular combustor/recuperator system comprising:

a combustor having a combustion chamber and a product of combustion gas outlet in fluid communication with said combustion chamber;

a fluid recuperator, comprising:

a frame;

an enclosure provided about said frame defining a recuperator chamber;

a product of combustion gas inlet in fluid communication with said recuperator chamber and said products of combustion gas outlet;

a product of combustion gas outlet in fluid communication with said recuperator chamber;

a plurality of spaced sealed recuperator units received within said recuperator chamber, each of said recuperator units having a body with an outer surface and an inner surface that defines a second fluid flow chamber;

a second fluid inlet in fluid communication with said plurality of sealed recuperator units; and

a second fluid outlet in fluid communication with said plurality of sealed recuperator units, whereby said recuperator is adapted to have the product of combustion gas flow through said product of combustion inlet, through said recuperator chamber across said sealed recuperator unit's outer surfaces and through said product of combustion outlet, respectively, while a second fluid passes through said second fluid inlet, through said second fluid flow chambers contacting inner surfaces of said sealed recuperator units and through said second fluid outlet in a manner that the product of combustion gas and the second fluid do not mix while passing through said recuperator chamber and heat transfer takes place between the product of combustion gas and the second fluid through said bodies of said sealed recuperator units.

25. An energy system comprising:

an annular combustor having an annular combustion chamber and a product of combustion gas outlet in fluid communication with said combustion chamber;

a turbine in fluid communication with said combustor product of combustion gas outlet;

a compressor driven by said turbine; and

an annular fluid recuperator, comprising:

a frame;

an enclosure provided about said frame defining a recuperator chamber;

a product of combustion inlet in fluid communication with said turbine and with said recuperator chamber;

a product of combustion outlet in fluid communication with said recuperator chamber;

a plurality of circumferentially spaced sealed recuperator units received within said recuperator chamber, each of said recuperating units having a body with an outer surface and an inner surface that defines a second fluid flow chamber;

a second fluid inlet in fluid communication with said plurality of sealed recuperator units and said compressor; and

a second fluid outlet in fluid communication with said plurality of sealed recuperator units and said combustor, whereby said recuperator is adapted to have the product of combustion gas flow through said product of combustion gas inlet, said recuperator chamber across said sealed recuperator unit's outer surfaces and through said first gas outlet, respectively, while a second fluid passes through said second fluid inlet, through said second fluid flow chambers, contacting inner surfaces of said sealed recuperator units and through said second fluid outlet in a manner that the product of combustion gas and the second fluid do not mix while passing through said recuperator chamber and heat transfer takes place between the gases through said bodies of said sealed recuperator units.

26. An energy system as claimed in claim 25, wherein said combustor is in fluid communication with said turbine which is mechanically coupled to said compressor, whereby when combustion takes place in the combustor, product of combustion gases drive the turbine through contact with

turbine blades, which then flow through a central passageway and enter said first fluid inlet, and said compressor driven by said turbine causes intake air to be compressed and flow through the second fluid inlet, so that said compressed air flows through said recuperator and exits said second fluid exit and flows through an intermediate passageway into said combustor.

27. The energy system as claimed in claim 26, wherein said intermediate passageway circumferentially surrounds an outer surface of said combustor.

28. A method for manufacturing a sealed recuperator unit comprising the steps of:

(a) providing a first section having an embossment;

(b) providing a second section;

(c) placing a corrugated member in the embossment;

(d) placing the second section over the first section; and

(e) welding said first section to said second section thereby forming a sealed recuperator unit.

29. A method as set forth in claim 28, further comprising the steps of:

(f) forming a fluid inlet in said sealed recuperator unit; and

(g) forming a fluid outlet in said sealed recuperator unit.

30. A method as set forth in claim 29, further comprising the step of:

brazing said corrugated member to said first section and said second section.

31. A method as set forth in claim 28, further comprising the step of:

welding a front member having a fluid inlet and a fluid outlet to the first section and the second section.

32. A method for cleaning a recuperator that includes:

a fluid recuperator, comprising:

a frame;

an enclosure provided about said frame defining a recuperator chamber;

a first fluid inlet in fluid communication with said recuperator chamber;

a first fluid outlet in fluid communication with said recuperator chamber;

a plurality of spaced, sealed recuperator units received within said recuperator chamber, each of said recuperator units having a body with an outer surface and an inner surface that defines a second fluid flow chamber;

a second fluid inlet in fluid communication with said plurality of sealed recuperator units;

a second fluid outlet in fluid communication with said plurality of sealed recuperator units, a plurality of open recuperator units positioned between said sealed recuperator units, respectively, each of said open recuperator units having a body defining flow passageways for the first fluid wherein at least one of the open recuperator units is fouled whereby said recuperation is adapted to have a first fluid flow through said first gas inlet, said recuperator chamber across said sealed recuperator unit's outer surfaces and through said first gas outlet, respectively, while a second fluid passes through said second fluid inlet, through

said second fluid flow chambers, contacting inner surfaces of said sealed recuperator units and through said second fluid outlet in a manner that the first fluid and the second fluid do not mix while passing through said recuperator chamber and heat transfer takes place between the gases through said bodies of said sealed recuperator units, said method comprising the steps of:

(a) removing at least one of said open recuperator units which is fouled; and

(b) replacing the removed open recuperator unit with a cleaned recuperator unit.

33. A method as set forth in claim 31, wherein the replaced open recuperator unit is either the removed open recuperator unit which has been cleaned, or a different cleaned or new open recuperator unit.

34. A fluid recuperator as claimed in claim 1, further comprising means for purging liquid fuel.

35. A fluid recuperator as claimed in claim 34, wherein said means for purging liquid fuel comprises a perforated conduit received in said recuperating chamber, said perforated conduit in fluid communication with a conduit external to said recuperating chamber and a valve attached to said conduit.

36. A fluid recuperator as claimed in claim 34, wherein said valve is a solenoid valve adapted to be open so that liquid fuel in the recuperating chamber can pass through the perforated tube when the recuperating chamber is provided with pressurized gas.

37. An annular combustor/recuperator system as claimed in claim 24, further comprising a combustor housing attached to said enclosure, said combustor housing surrounding said combustor and defining a portion of said second fluid inlet.

38. An annular combustor/recuperator system as claimed in claim 37, further comprising a front plate removably secured to said combustor housing, whereby removal of said front plate permits removal of said combustor from said combustor housing for access to said combustor.

39. A recuperator as claimed in claim 11, further comprising an outer annular sleeve for holding said sealed recuperator units in intimate contact with said open recuperator units.

40. A recuperator as claimed in claim 39, comprising a fluid seal positioned between said sleeve and said enclosure for preventing said first fluid from passing between said sleeve and said enclosure.

41. A method for forming a joint, comprising the steps of:

(a) providing a first metallic member having a first thickness and having a lip;

(b) providing a second metallic member having a slot for receipt of the lip, said second metallic member having a second thickness, the second thickness is greater than the first thickness;

(c) placing the lip within the slot so that a tip of the lip extends beyond the slot;

(d) heating the tip until the tip melts;

(e) heating the second metallic member adjacent the tip so that the melted tip causes the first metallic member to weld to the second metallic member about the lip; and

(f) permitting the first metallic member and the second metallic member to cool, thereby forming a welded joint about the lip.

42. A method as claimed in claim 41, wherein the heating is accomplished through a flame.

43. A method as claimed in claim 41, wherein said heating is accomplished through an arc welder.

44. A method as claimed in claim 41, wherein the welded joint is a fluid tight welded joint.

45. A fluid recuperator as claimed in claim 1, wherein said sealed recuperator units are curve shaped.

46. A fluid recuperator as claimed in claim 9 wherein said open recuperator units are curve shaped and said sealed recuperator units are curve shaped.

47. A method as set forth in claim 28 further comprising the steps of:

curving said first section; and

curving said second section.